Renewable Energy in the Coastal Zone

Viable Technologies and Projects

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ACEP
Alaska Center for Energy and Power

The Alaska Center for Energy and Power is a gateway for energy research at the University of Alaska.

ACEP Goal:

To put the right information in the hands of the right people to make the right decisions to reduce the risk of implementing energy solutions in Alaska.

The right solutions must be technologically, socially and economically pragmatic.

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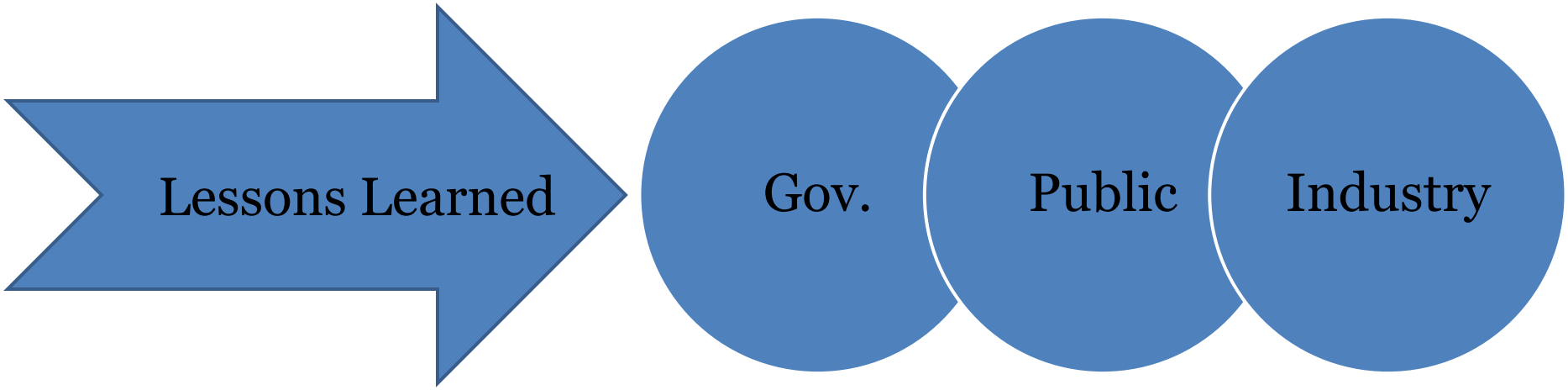
Key to Success in Alaska: Share Lessons Learned

"A critical element of funding emerging energy technology projects is the inclusion of a robust data collection and analysis component."



Common Challenges to Renewables

Resource does not always match the load
Many are emerging technologies in Alaska
Integration of energy onto microgrids
Transmission
Operations and Maintenance
Managing the resource for sustainability
Equating new energy to lower bills

Diesel Engine Efficiency

- **Includes waste heat capture, fuel augmentation, and alternative fuels**
- **Single biggest potential impact to current rural energy issues**

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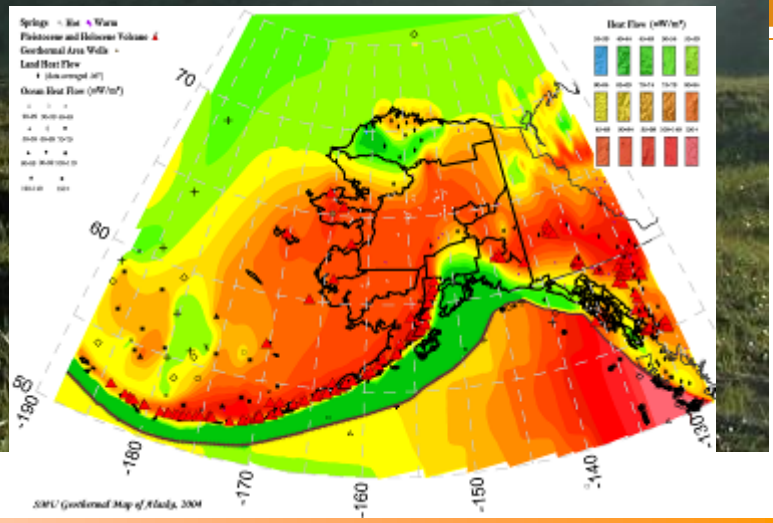
Project: Organic Rankine Cycle Heat Recovery System

- Recipient: Tanana Chiefs Council
- Partners: UAF, Alaska Energy Authority

Demonstrating the potential improved fuel efficiency of the diesel power plant in a village in the TCC region through the use of an Organic Rankine Cycle (ORC) system for heat recovery from engine jacket water and exhaust.

Geothermal Energy

- **Energy from high and low temperatures**
- **Resources are unknown**
- **Expensive exploration**
- **Often ‘stranded’**
- **Must be managed to be renewable**



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Project: Seawater Heat Pump Demonstration Project

- Recipient: Alaska SeaLife Center
- Partners: Your Clean Energy, City of Seward, Alaska Energy Authority

Install and monitoring a heat pump system that will "lift" latent heat from raw seawater at temperatures ranging from 35°F to 55°F, and transfer this heat energy into building heat at a temperature of 120°F.

Solar in Alaska?

- Demand does not match resource
- Solar thermal technology is showing promise
- Solar thermal allows for multiple uses of the stored energy

Project: Feasibility of Solar Hot Water Systems

- Recipient: Kotzebue Electric Association
- Partners: Kotzebue Community Energy Task Force, ABS Alaska, Susitna Energy, NANA

Assessing the feasibility of solar thermal hot water heating systems integrated into elder housing in the NANA region.

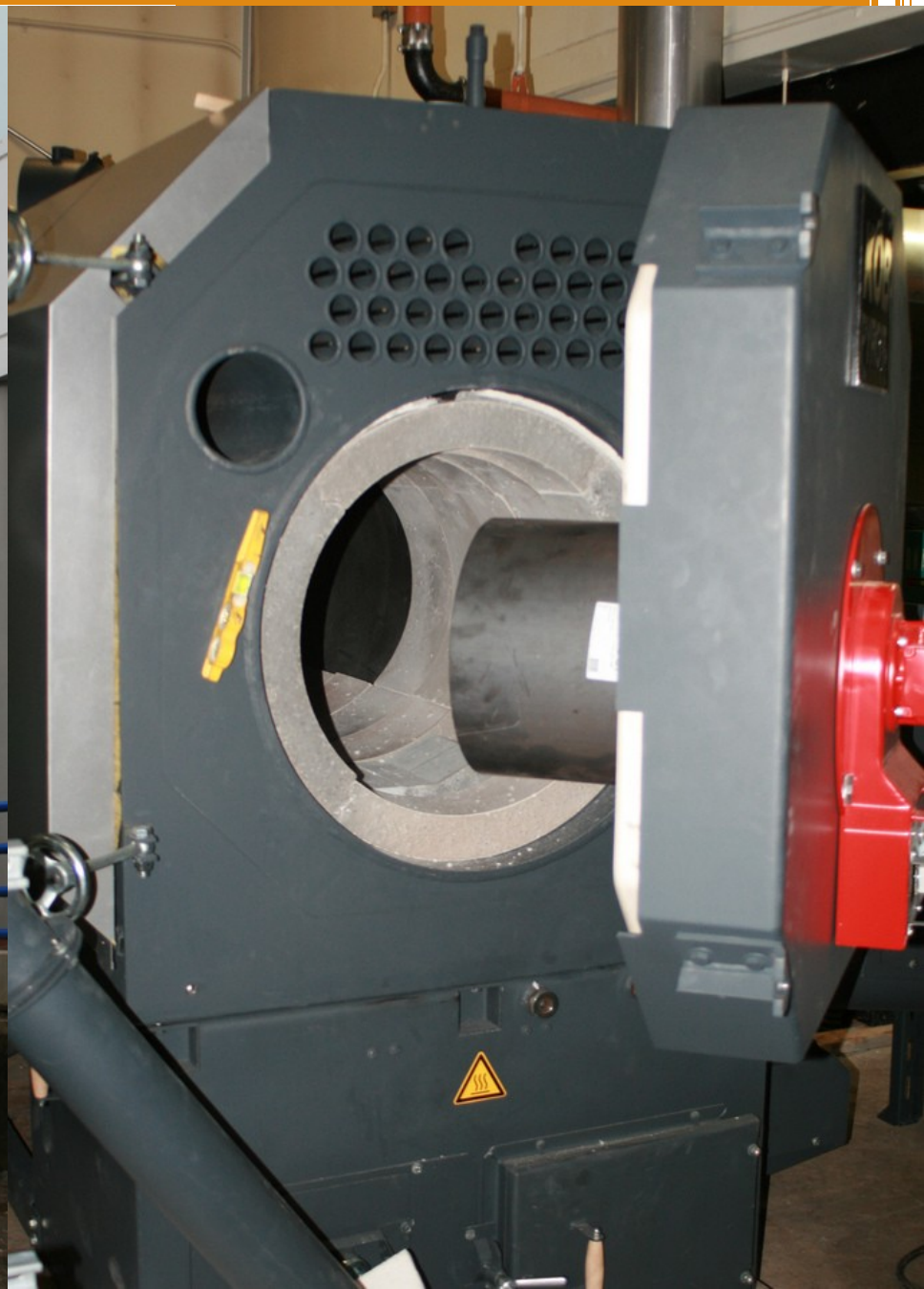
Biomass

- Wet or Dry
- Dry: Cord Wood, Chips or Pellets – consider source
- Wet: Biodigesters, fish oil
- Can be co-fired
- Great for combined heat and power
- Must be managed to be renewable

Project: Commercial Scale Wood Pellet Fired Boiler

- Recipient: Sealaska Corporation

Sealaska Corporation will be converting their corporate headquarters building from a diesel fired boiler to a wood pellet fired boiler, demonstrating commercial scale application of the technology and assessing the market potential of biomass in South East Alaska.



Project: Psychrophiles for Generating Heating Gas

- Recipient: Cordova Electric Cooperative
- Partners: Cordova Schools, UAF-INE, Solar Cities

Research and application project, deploy the use of psychrophiles (cold loving microbes) to improve efficiency in biogas digestors for generating cooking and heating gas for Alaskan households.

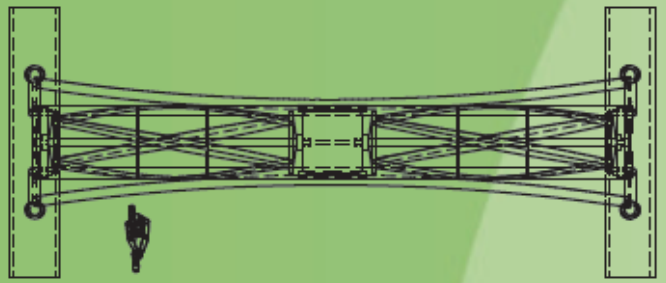
Hydrokinetics

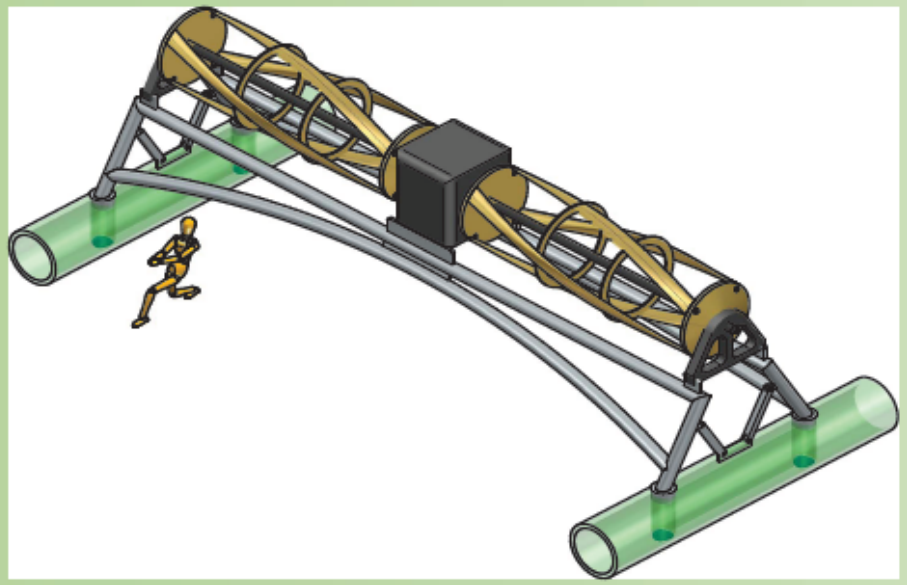
- Most turbines are pre-commercial
- Can be tidal, wave or in-river
- Critical issues are around environmental impacts like icing, debris, sediment and fish

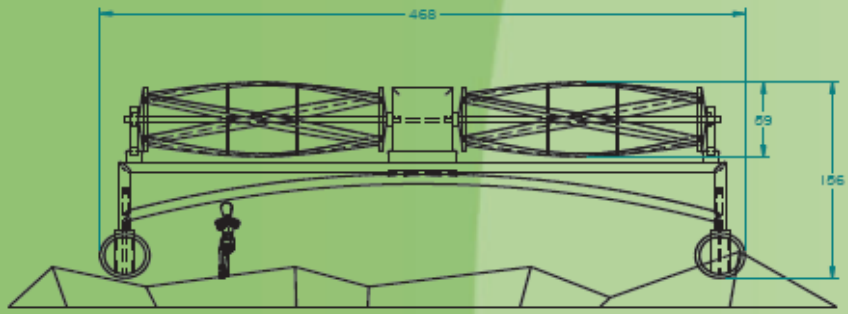
Project: Nenana RiveGen™ Hydrokinetic Turbine

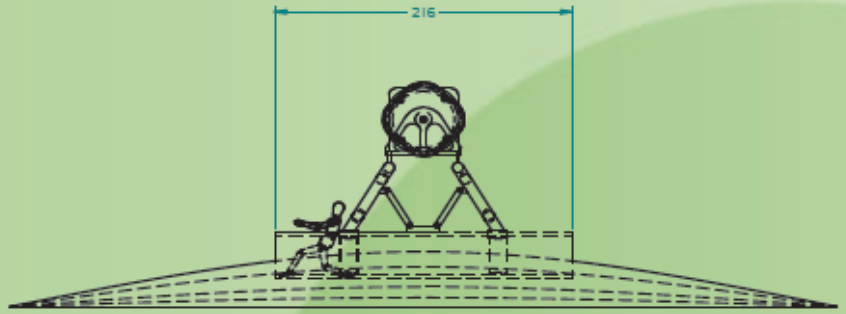
- Recipient: Ocean Renewable Power Company
- Partners: UAF – AHERC, NREL

ORPC proposes to build, install and test the RivGen™ Power System, a hydrokinetic energy unit, at the Nenana hydrokinetic test bed and analyze resource and technology results.









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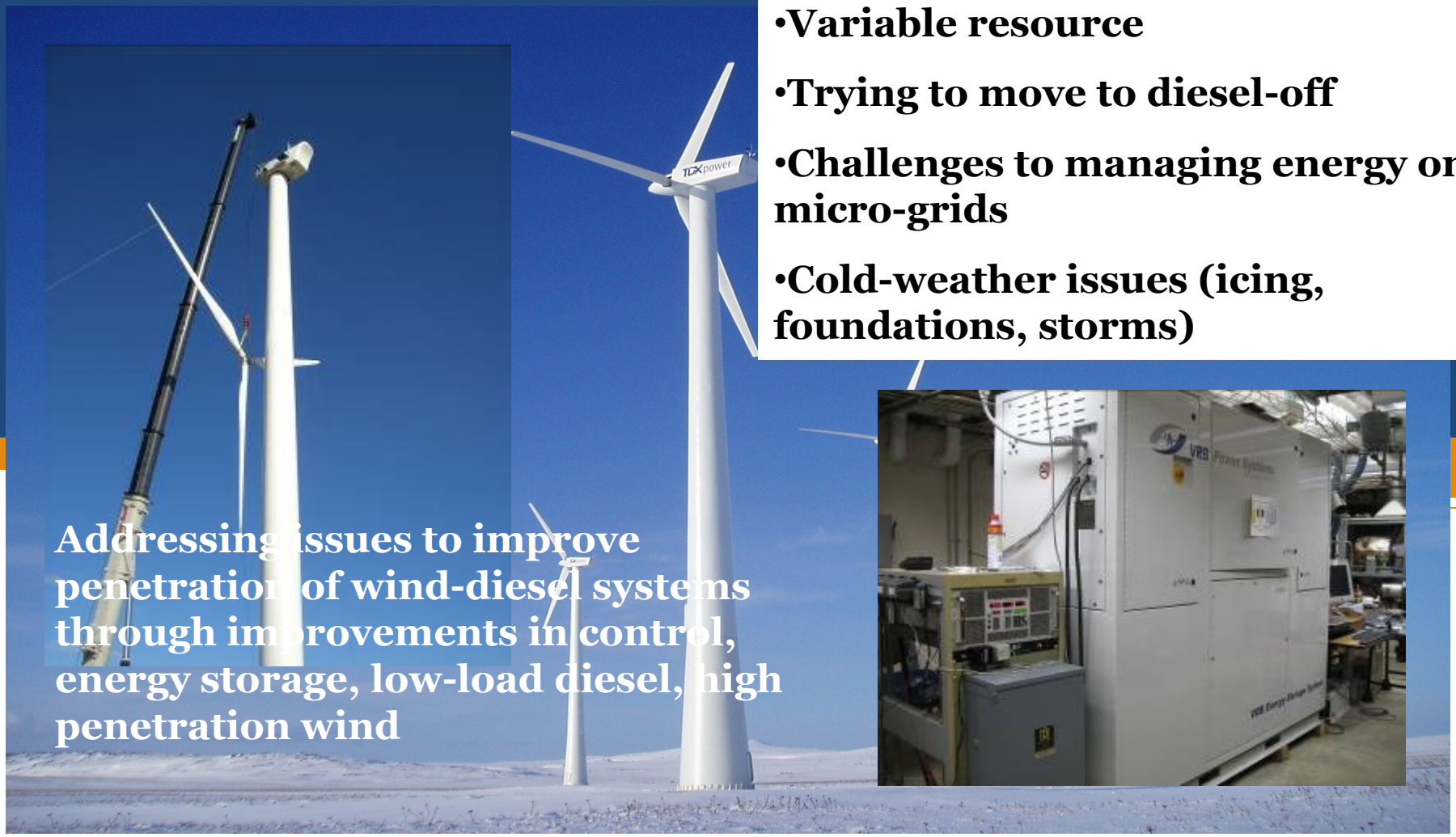
Project: Yukon Hydrokinetic Project

- Recipient: Alaska Power and Telephone
- Partners: New Energy Corp, ABS Alaska

Alaska Power Company's goal for this project is the development and assessment of a hydrokinetic project in the Yukon River, near Eagle, Alaska.

Wind Energy

- Commercial technology
- Variable resource
- Trying to move to diesel-off
- Challenges to managing energy on micro-grids
- Cold-weather issues (icing, foundations, storms)



Addressing issues to improve penetration of wind-diesel systems through improvements in control, energy storage, low-load diesel, high penetration wind

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Project: Wales Diesel-Off High Penetration Wind System

- Recipient: Kotzebue Electric Association
- Partners: AVEC, Western Community Energy

Kotzebue Electric Association will demonstrate diesel-off configuration for a remote wind-diesel high penetration hybrid power system through the retrofit of existing equipment and controls.

Project: Flow Battery Energy Storage Systems

- Recipient: Kotzebue Electric Association
- Partners: NRECA, UAF, Premium Power

Kotzebue Electric Association's goal for this project is to analyze and demonstrate flow battery systems and their potential for energy storage in rural wind systems.

Project: High Voltage Direct Current Transmission

- Recipient: Polarconsult Alaska
- Partners: Princeton Power, Manitoba HVDC Research Center

Polarconsult Alaska, in partnership with Princeton Power Systems, is developing High Voltage Direct Current transmission and converter technology, with a goal to assess and demonstrate the technical and financial feasibility of low-cost small-scale HVDC interties for rural Alaska.

Alaska Rural Energy Conference

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